peaceable conclusion the Chinese Government had ordered large quantities of telegraph material from England, and within a few months of the ratification of the treaty with Russia, we find the port of Peking connected by telegraph with the rest of the world. The Chinese may occasionally be slow in their mental processes, but the present instance shows that when once the utility of an innovation is clearly presented to their minds, they seize and assimilate it with a rapidity worthy of their more mercurial neighbours, the Japanese; and this, it will be observed, is as true of the Government as of individuals.

It is not yet known how far the new lines will be open for public use; but, judging by the rapid spread of other foreign inventions in China when once introduced, we cannot be far wrong in anticipating a vast extension of the telegraph for all purposes in that country. Ten or twelve years ago there was hardly a Chinese-owned steamer engaged on the coasts or inland waters of the empire; 84 per cent. of this trade is now carried on in Chinese bottoms. Large and well-appointed steamers, Chinese-owned and manned, now ply to every port along the coast and on the Yang-tsze. As we write, a Chinese steamer has arrived in the Thames, bringing several native merchants who are about to enter into competition with us on our own ground. From time to time we have recorded in NATURE the various stages in the progress of the new telegraph line, because it marks one of the most important steps that has ever been made in China towards the adoption of the results of Western science and civilisation. It is one of the very few improvements which she has adopted without external advice and pressure; in this instance she has sat at the feet of the best of all teachers, experience, and has profited by its precepts. Nor is the event any the less important when we reflect on the development possible for the other appliances of steam and electricity, now that the ice of dislike and distrust of innovation has been spontaneously broken. The intelligence and enterprise of the three hundred millions of the people of China will not long remain content with a single line of telegraph across a comparatively small corner of their vast territory. A race of men with strong mercantile instincts who seize with avidity on every time—or labour-saving appliance, the Chinese, now that their government has abandoned its most cherished prejudice, may well be expected to call for the extension of an invention such as the telegraph.

We may fitly conclude this attempt to forecast the future in China of one of the most remarkable productions of western science in the nineteenth century, by mentioning the lesson which may well be derived from our past intercourse with that country. It is worse than useless to thrust our improvements by force or threats on the Chinese. When left themselves to the results of their own experience and slow methods of thought, their advances, though occasionally tardy, are surer and more satisfactory. It can hardly be a matter for wonder that a people who have been taught to revere the teaching of their sages for nearly 3000 years as the highest products of human wisdom, and whose minds have been cast in the same mould from a period long anterior to our era, should look askance at the inventions of the modern man of science who knows nothing of the system of ethics and politics of Confucius and Mencius, and the other sages of antiquity. A few years ago a foreign company in China constructed, without the formal sanction of the Chinese authorities, a line of railway a few miles in length between Shanghai and Woosung, at the mouth of the Shanghai River. The government repeatedly called for the cessation of the traffic on the ground that its consent had not been obtained, and that it did not want railways in its territories. Finally, in order to prevent any complications respecting ownership, it purchased the line, destroyed it utterly, and sent the materials to Taiwan in Formosa, where, according to the latest accounts, they were lying rotting; and they did all this notwithstanding the arguments and protests of foreign ministers and diplomatists. They were determined at all cost to rid themselves of an innovation which had been thrust on them. On the other hand, a recent *Peking Gazette* published a memorial from the Governor-General of Shansi, one of the most powerful officials in the Empire, requesting authority to lay down a line of railway to certain mines in his province. Preliminary surveys have already been made, and the memorialist goes so far as to demonstrate to the Emperor that had such a railway been in working order a few years ago, much of the misery and horrible loss of life in the Shantung famine might have been prevented. It is from bitter experiences such as these that the Chinese learn; the devices of diplomatists or promoters are thrown away on them.

THE VOYAGE OF THE "VEGA" [1]

THE voyage of the *Vega* will be in many respects one of the most memorable events in the history of navigation. For the first time a continent has been circumnavigated, so far as authentic record goes, and at last the North-East Passage has been won, after heroic efforts begun nearly three and a half centuries ago. As Baron Nordenskjöld reminds us in these volumes, the North-West Passage, although explored, has never been navigated entirely by any ship, McClure's famous journey having been accomplished partly in sledges over the ice. But the voyage will be still more memorable by the two rich volumes in which it finds copious record, volumes which have scarcely a parallel in the whole literature of geographical exploration. For Baron Nordenskjöld has not contented himself with merely telling the story of his own successful voyage and its results. That voyage, as we have said, crowns the efforts of centuries, and it has been by the results of these efforts that the *Vega* has accomplished her work with scarcely an adverse incident. It will be remembered that some six years ago Baron Nordenskjöld showed that the voyage from Norway to the mouth of the Yennissei could easily be accomplished in a week or two, if taken at the proper time. Since then trading ventures have gone over the course every year, and a regular trade-route may be held as established by the well-informed enterprise of the eminent Swedish professor. For something like twenty years Baron Nordenskjöld has been at work in the seas to the north of Europe, and mainly in Spitzbergen, and the rich results of them are known to all students of science, and their story was told about two years ago in an interesting work noticed in these pages. Thus he became probably more familiar with the ice-conditions of these northern seas than any other authority; and his success in the Yennissei expedition led him to think that there was no reason why the whole North-East Passage should not be navigated. But Baron Nordenskjöld is, above all, a man of science, and accustomed to go about his work in a scientific method. That he has the true spirit of adventure is proved by the work of half his lifetime, but then he has a weakness for entering upon his enterprises with his eyes open, of knowing where he is going, and what are likely to be the results to science. So before making up his mind about the North-East Passage, the Baron examined carefully all the records of previous voyages along the north coast of Europe and Asia, from the time of Othere, a thousand years ago, down to the latest adventures of the brave Norwegian skippers. Thus he found that at one time or other the whole of this stretch of coast had been navigated piecemeal, except the most northerly point of the old continent, Cape Chelyuskin,

[1] "The Voyage of the *Vega* round Asia and Europe; with a Historical Review of previous Journeys along the North Coast of the Old World." By A. E. Nordenskjöld. Translated by Alexander Leslie. Five steel portraits, numerous maps and illustrations. Two vols. (London: Macmillan and Co., 1881.)

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which had baffled all the attempts of those daring Russian sailors of the seventeenth and eighteenth centuries, who, in "floating coffins" and with many disasters, had explored the entire coast of Siberia. Baron Nordenskjöld saw that the ice in these regions has its times and seasons. To set out earlier than the middle of July he found would be to court delay and disaster. About that time the ice about Novaya Zemlya and in the Kara Sea begins to break up, and later on it generally retires from the north coast of Asia, being liable, however, to be blown south again by a north wind. In ordinary seasons, however, he inferred from the records of previous voyagers, a broad free lane of water might be looked for on to Behring Straits. In this respect the north coast of Asia differs materially from that of America. The eastern half of the latter is so hemmed in by islands that the ice has no scope for retiring completely, and so the North-West Passage under existing conditions is almost impossible for a ship. The fact that the ice is so easily blown back by a north wind to the coast of Asia gives ground to infer that a ring of islands stretches from Franz Josef Land to Wrangel Land, an inference confirmed by other characteristics. With his scheme so clearly and fully worked out, Baron Nordenskjöld went to the King of Sweden, who gave it hearty support. The result was that the king, in conjunction with the munificent Mr. Oscar Dickson of Gothenburg, who has spent a fortune in the cause of science, and Mr. Sibiriakoff, a Siberian merchant, agreed to advance the funds for an expedition round the continents of Europe and Asia. The *Vega*, a barque-rigged steamer of the best oak, 357 tons register, with engines of 60 horse-power, steaming 6 to 7 knots an hour, was bought, and specially fitted for her peculiar work. A staff of officers and men of science was carefully selected, and a picked crew of twenty-one men, with Baron Nordenskjöld himself as the leader of the expedition. The chief officer was Capt. Palander, of the Royal Italian Navy; Dr. F. R. Kjellman acted as botanist, Dr.

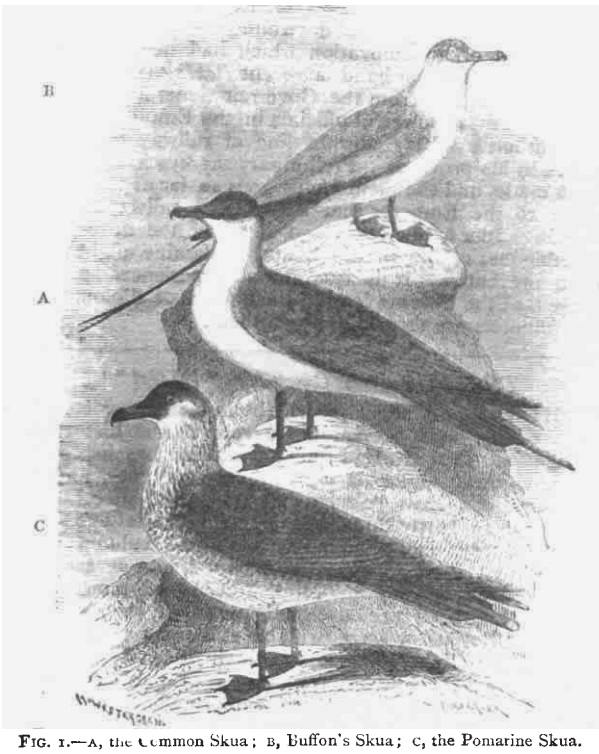

FIG. 1.—A, the Common Skua; B, Buffon's Skua; C, the Pomarine Skua.

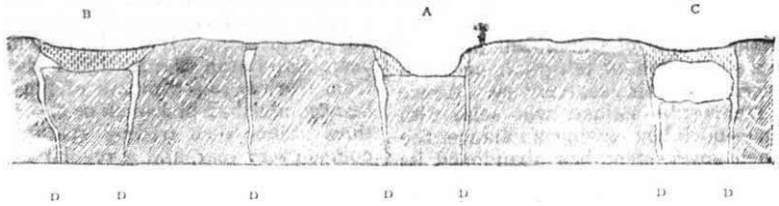

FIG. 2.—Section of Inland-ice. A, open glacier canal; B, snow-filled canal; C, canal concealed by a snow-vault; D, glacier-clefts.

Stuxberg, zoologist, Herr Almquist, medical officer and lichenologist, Lieut. Brusewitz, second officer, Lieut. Bove, of the Italian Navy, hydrographer, Lieut. Hovgaard, of the Danish Navy, for magnetism and meteorology, and

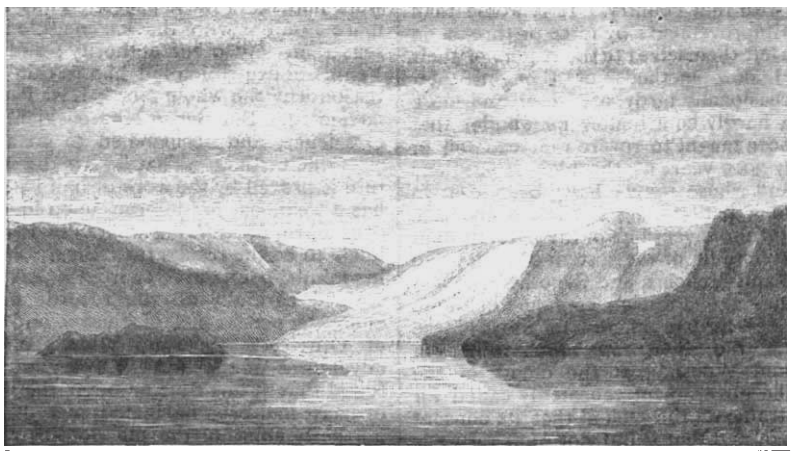

FIG. 3.—Glacier with stationary front, Udde Bay, on Novaya Zemlya, after a drawing by Hj. Théel (1875).

Lieut. Nordquist, of the Russian Guards, interpreter and zoologist. Baron Nordenskjöld, besides being eminent as a geologist and mineralogist, we need not say, was a host in himself. It will thus be seen that the expedition was perfectly equipped for scientific work.

We have said that Baron Nordenskjöld's work is far

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more than a mere narrative of the voyage of which he was the organiser and commander. Not only does he give an exhaustive account of all previous voyages in these regions, but enters into the amplest details as to the scientific results achieved up to the present time. The work is thus a mine of unusual richness for the student of science, while it is so written as to be not only intelligible but delightful to any ordinary intelligent reader. As the *Vega* pursues her course, the leader stops every now and then to tell his readers of the voyages associated with a particular region, or of the knowledge we have of its geography, geology, and biology. Many matters of the widest scientific importance thus come to be introduced, and questions discussed of burning interest in various departments of science. In following the course of the *Vega* we shall attempt to give our readers some faint idea of the riches stored up in these two volumes.

The *Vega* was accompanied by the *Lena* as far as the mouth of the river of that name, for the commercial navigation of which she was destined, and part of the

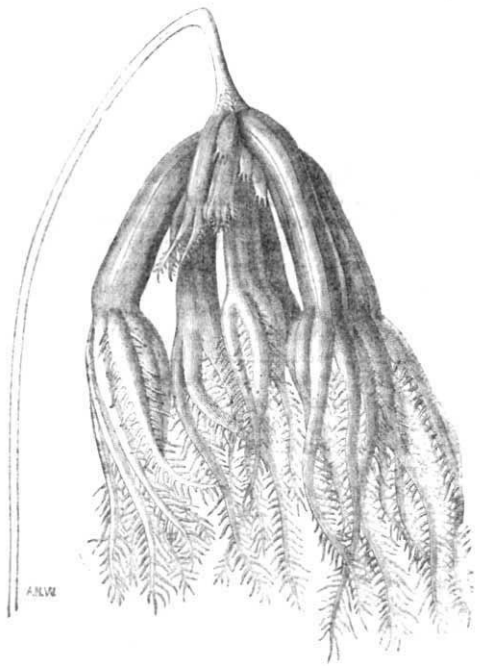

FIG. 4.—Umbellula from the Kara Sea.

way by the *Fraser* and *Express* as tenders. Coming round from Karlskrona, the expedition left Tromsoe on July 21, 1878. At Moosoe, near the North Cape, it was discovered that cloudberries and rum formed an excellent antidote to scurvy, and a stock was laid in, and whether from their use or from the carefully regulated diet on board the *Vega*, of which details are given, there was not a trace of scurvy during the whole voyage, and indeed no illness at all to speak of. As he rounded the corner of Europe, the Baron stops to tell us of early voyages in this direction, of Othere, whose story was told by King Alfred, Willoughby and Chancellor, Pet, and Jackman, and others. and to show us some old maps in which the coast is rudely laid down. The work is specially rich in maps from the tenth century down, including a large scale map of the north coast of Europe and Asia, in which the *Vega's* data have been incorporated. The vessels *rendezvoused* at Yuger Schar, between Waygats Island and the mainland on July 31. And here opportunity is taken of telling us all that is known about the Samoyeds of the island and mainland, from the earliest voyages down to the visit of the *Vega*, with abundant illustrations. Then follows a chapter of the greatest possible interest on the animal world of Novaya Zemlya, which becomes really an account of Arctic zoology. First we have a complete account of the birds, with wealth of illustration. The variety is wonderful, and evidently the habits of the interesting creatures have been carefully studied by Baron

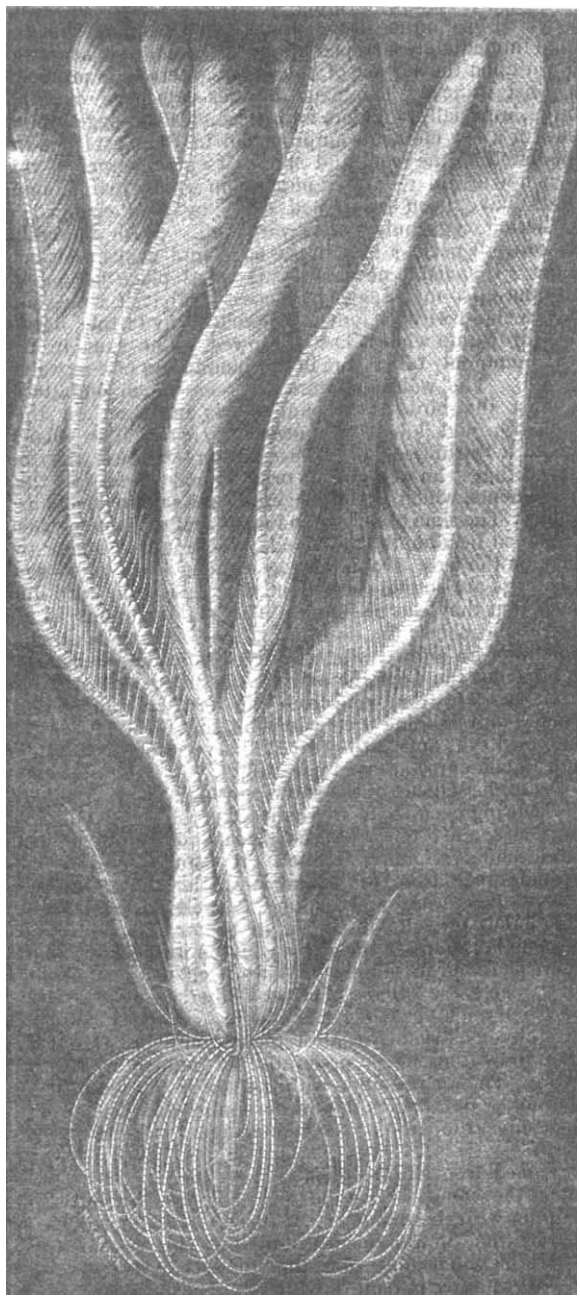

FIG. 5 —Hairstar from the Taimur Coast (three-fifths of natural size).

Nordenskjöld. Here, for example, is a graphic picture, with its accompanying illustration (Fig. 1):—

"Often during summer in the Arctic regions one hears a penetrating shriek in the air. When one inquires into the reason of this it is found to proceed from a kittiwake, more rarely from a glaucous gull, eagerly pursued by a bird as large as a crow, dark-brown, with white breast

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and long tail-feathers. It is *labben*, the common skua (*Lestris parasitica*, L.), known by the Norwegian walrus-hunters under the name of *tjufjo*, derived from the bird's cry, '*I-o i-o*,' and its shameless thief-nature. When the 'tjufjo' sees a kittiwake or a glaucous gull fly off with a shrimp, a fish, or a piece of blubber, it instantly attacks it. It flies with great swiftness backwards and forwards around its victim, striking it with its bill, until the attacked bird either drops what it has caught, which is then immediately snapped up by the skua, or else settles down upon the surface of the water, where it is protected against attack. The skua besides eats eggs of other birds, especially of eiders and geese. If the eggs are left but for a few moments unprotected in the nest it is immediately to the front and shows itself so voracious that it is not afraid to attack nests from which the hatching birds have been frightened away by men engaged in gathering eggs only a few yards off. With incredible dexterity it pecks a hole in the eggs and sucks their contents. If speed is necessary this takes place so quickly and out of so many eggs in succession that it sometimes has to stand without moving, unable to fly further until it has thrown up what it has swallowed. The skua in this way commonly takes part in the plundering of every eider island. The walrus-hunters are very much embittered against the bird on account of this intrusion on their industry, and kill it whenever they can. The whalers called it 'struntjaeger'—refuse-hunter—because they believed that it hunted gulls in order to make them void their excrements, which 'struntjaegeren' was said to devour as a luxury. The skua breeds upon low, unsheltered, often water-drenched headlands and islands, where it lays one or two eggs on the bare ground, often without trace of a nest. The eggs are so like the ground that it is only with difficulty that they can be found. The male remains in the neighbourhood of the nest during the hatching season. If a man, or an animal which the bird considers dangerous, approaches the eggs, the pair endeavour to draw attention from them by removing from the nest, creeping on the ground and flapping their wings in the most pitiful way. The bird thus acts with great skill a veritable comedy, but takes good care that it is not caught."

Again he tells us of the snow-bunting:

"During excursions in the interior of the land along the coast, one often hears, near heaps of stones or shattered cliffs, a merry twitter. It comes from an old acquaintance from the home land, the *snoesparfven* or *snoelaerkan*, the snow-bunting (*Emberiza nivalis*, L.). The name is well chosen, for in winter this pretty bird lives as far south as the snow goes on the Scandinavian peninsula, and in summer betakes itself to the snow limit in Lapland, the *tundra* of North Siberia, or the coasts of Spitzbergen and Novaya Zemlya. It there builds its carefully-constructed nest of grass, feathers, and down, deep in a stone heap, preferably surrounded by a grassy plain. The air resounds with the twitter of the little gay warbler, which makes the deeper impression because it is the only true bird's song one hears in the highest north."[1]

Then Baron Nordenskjöld goes on to do for the mammalia the same service he has done for the birds, beginning with the reindeer. It thrives as far north as 80° and 81°, and in a temperature of − 40° to − 50° C.

"It is remarkable that the reindeer, notwithstanding the devastating pursuit to which it is exposed on Spitzbergen,[2] is found there in much larger numbers than on North Novaya Zemlya or the Taimur Peninsula, where it is almost protected from the attacks of the hunter. Even on the low-lying part of South Novaya Zemlya the reindeer, notwithstanding the abundance of the summer pasture, is so rare that when one lands there, any reindeer-hunting is scarcely to be counted on. It first occurs in any considerable numbers farther to the north, on both sides of Matotschkin Schar."

Notwithstanding the immense destruction of the reindeer in recent times their numbers in Spitzbergen keep so well up that it has been supposed they migrate from Novaya Zemlya. But Baron Nordenskjöld shows that this is not the case, as the reindeer of the two islands belong to different races. The fact that *marked* reindeer have been found in Spitzbergen has also led to the supposition that they found their way from some more northerly inhabited land, a supposition that does not seem probable, but is certainly worth verifying. Then we have our old friend the Polar bear, followed by the mountain-fox and the lemming. The marine life of these northern regions makes up amply for any scarcity of life on land.

"Here animal life is exceedingly abundant as far as man has succeeded in making his way to the farthest north. At nearly every sweep the dredge brings up from the sea-bottom masses of decapods, crustacea, mussels, asterids, echini,[1] &c., in varying forms, and the surface of the sea on a sunny day swarms with pteropods, beroids, surface-crustacea, &c."

Of the higher animal types of these seas the walrus, now that the right whale is nearly extinct, is the most important, and therefore comes in for a long notice. Even the walrus has suffered greatly from excessive hunting, and unless precautions are taken, will go the way of the right whale. The walrus haunts particular places of Novaya Zemlya and Spitzbergen, attracted by the abundance of their special food, which does not consist, as is often stated, of seaweed, but of various living mussels from the bottom of the sea, principally *Mya truncata* and *Saxicava rugosa*. Seals and whales are also referred to at some length.

Through Yugor Schar the vessels steamed their way into the Kara Sea on August 1. And here we are told a great deal about inland ice and icebergs, and the rich life-conditions of the Kara Sea, its surroundings and hydrography. The remarks on inland ice are specially valuable, the subject being illustrated by the writer's extensive experience in Greenland and Spitzbergen. We reproduce here (Fig. 2) a section which he gives of inland ice, and a picture of a Novaya Zemlya glacier (Fig. 3). The inland ice, Baron Nordenskjöld tells us, is of too inconsiderable extent to allow of any large icebergs being formed. There are none such accordingly in the Kara Sea, and it is seldom that even a large glacier ice-block is to be met drifting about. Indeed the Baron tells us that the popular notion as to the frequency of true icebergs in the far north is quite erroneous, the actual fact being that icebergs occur in far greater numbers in the seas which are purely accessible. The abundance of life in the Kara Sea is remarkable, though this has only been recently known, the old notion on this point being quite erroneous. As a specimen of the life to be found in this sea, we give here an Umbellula (Fig. 4).

Dickson's Harbour, at the mouth of the Yennissei, was reached on August 6, and so the first stage of the voyage was happily completed. Beyond this all was new, but it seemed to be felt that if Cape Chelyuskin was safely passed, all the rest would be comparatively easy. Here upwards of 100 pages are devoted to various topics of

[1] There are, however, various other song-birds found already on south Novaya Zemlya, for instance, *lappsparfven*, the Lapland bunting (*Emberiza lapponica*, L.), and *berglaerkan*, the shore-lark (*Alauda alpestris*, L.). They hatch on the ground under bushes, tufts of grass, or stones, in very carefully constructed nests lined with cotton-grass and feathers, and are not uncommon.

[2] The hunters from Tromsoe brought home, in 1868, 996; in 1869, 975; and in 1870, 837 reindeer. When to this we add the great number of reindeer which are shot in spring and are not included in these calculations, and when we consider that the number of walrus-hunting vessels which are fitted out from Tromsoe is less than that of those which go out from Hammerfest, and that the shooting of reindeer on Spitzbergen is also carried on by hunters from other towns, and by tourists, we must suppose that at least 3000 reindeer have been killed during each of those years. Formerly reindeer stalking was yet more productive, but since 1870 the number killed has considerably diminished.

[1] Echini occur only very sparingly in the Kara Sea and the Siberian Polar Sea, but Novaya Zemlya at certain places in such numbers that they almost appear to cover the sea-bottom.

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interest suggested by the arrival of the Expedition at the mouth of the Yennissei. Evidence is given to prove that the lower Yennissei must at one time have been thickly inhabited, but is now quite deserted, probably owing to the difficulty of procuring food, a difficulty that may be solved by the enterprises begun by Baron Nordenskjöld. A long list of phanerogams is given, collected during the stay of the expedition. Some interesting dredging results were obtained, and on this subject Baron Nordenskjöld writes :—

"For the science of our time, which so often places the origin of a northern form in the south, and *vice versâ*, as the foundation of very wide theoretical conclusions, a knowledge of the types which can live by turns in nearly fresh water of a temperature of + 10°. and in water cooled to – 2°·7, and of nearly the same salinity as that of the Mediterranean, must have a certain interest. The most remarkable were, according to Dr. Stuxberg, the following : a species of Mysis, *Diastylis Rathkei*, Kr., *Idothea entomon*, Lin., *Idothea Sabinei*, Kr., two species of Lysianassida, *Pontoporeia setosa*, Stbrg., *Halimedon brevicalcar*, Goës, an Annelid, a Molgula, *Yoldia intermedia*, M. Sars, *Yoldia* (*?*) *arctica*, Gray, and a Solecurtus."

On the long Yalmal Peninsula on the west of the Gulf of Obi, the author collects all the information known, but that is not much. The ground everywhere seems to consist of sand and sandy clay, and Baron Nordenskjöld, when he landed, could not find a stone so large as a bullet or a pea. Two chapters are devoted to a history of the navigation of the North-east Passage from 1556 to 1878 ; an admirable summary, containing much that is the result of the author's own research, and which never before has seen the light. Especially is this the case with the numerous Russian voyages of the seventeenth, eighteenth, and nineteenth centuries, of which little is known, but the results of which Baron Nordenskjöld acknowledges have been of the greatest service to him in forming his own plan. To the efforts of the Norwegian walrus hunters, too, Carlsen, Tobiesen, Johanessen, and others, he does full justice ; and indeed their contributions to science have often been of substantial value; Johanessen, was awarded two medals by the Swedish Academy for his discoveries.

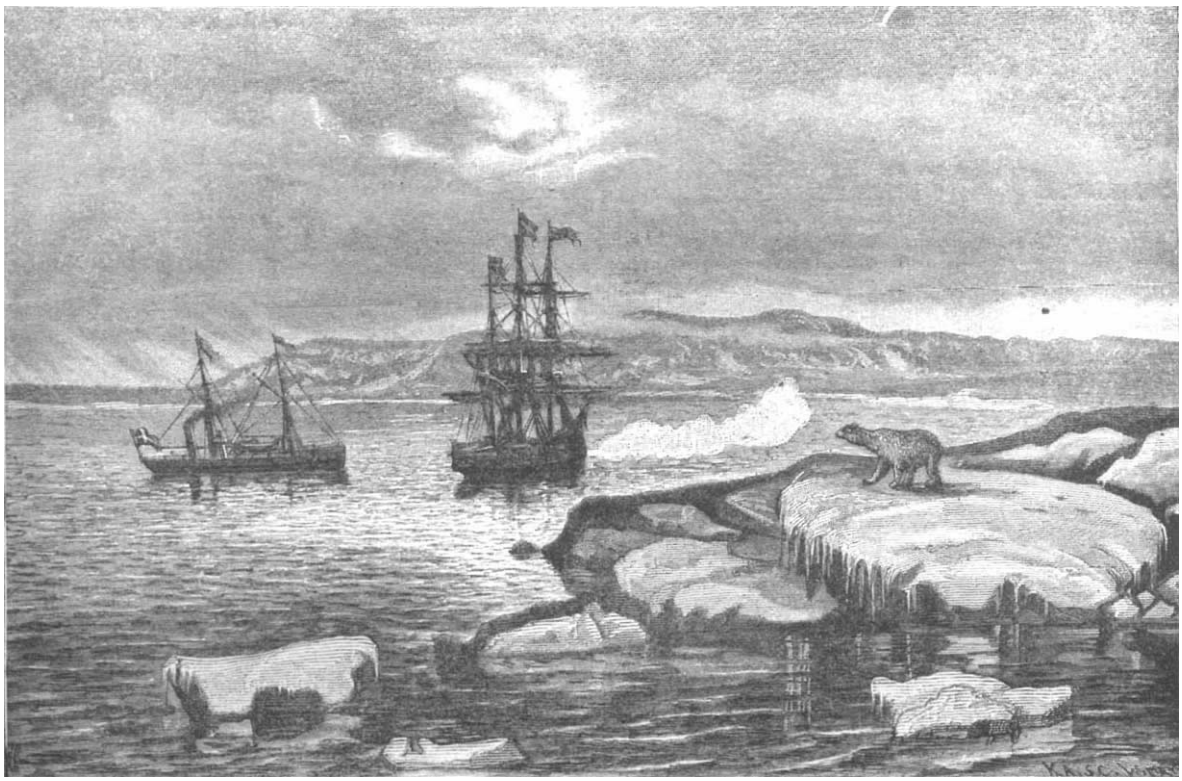

FIG. 6.—The *Vega* and *Lena* saluting Cape Chelyuskin.

Port Dickson was left on August 10, and as the *Vega* steamed north-east to Chelyuskin over an imperfectly mapped coast, she came across many new islands, and other novelties which we cannot refer to in detail. Animal life along the Taimur coast was much scarcer than in previous parts of the voyage, though on the other hand the sea yielded some fine specimens. We give as an example a hairstar (Fig. 5) from off the coast.

The northern promontory of Asia was reached on August 19, and Baron Nordenskjöld describes the landscape as "the most monotonous and desolate I have ever seen in the High North" (Fig. 6). Here, however, we must leave the *Vega* till next week.

(*To be continued.*)

NOTES

TAKING a retrospective *coup d'œil*, in a recent issue of his paper, of the Paris Exhibition, Count du Moncel notes, among other points, the marked success of the lectures, and the eagerness of the public to be instructed. A permanent electrical exhibition, with like facilities, would greatly promote the development of electric industries. The number of practical electricians in France is at present very limited, and while there are some very skilful makers of telegraphic apparatus and instruments for

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